

**ABSTRACT**

The invention provides systems and methods of manipulating biological or chemical species. The species may be attached to a magnetic particle which is manipulated using micro-magnetic fields. In some cases, the magnetic fields are generated by current carrying wires that are patterned on a substrate. The magnetic fields define channels on the surface of the substrate in which the magnetic particles and attached species may be transported, positioned and stored. In other cases, the magnetic fields are generated by magnetic features located within the channels on the surface of the substrate. Thus, the systems and methods can manipulate biological or chemical species on a microscale (e.g., less than 5  $\mu\text{m}$ ).

Applications of the systems and methods are in, but are not limited to, the fields of biotechnology, microanalysis, and microsynthesis.